

TRANSMITTAL LETTER TO THE UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US) CONCERNING A FILING UNDER 35 U.S.C. 371		ATTORNEY'S DOCKET NUMBER: 8-1032-167
		U.S. APPLICATION NO. (If known, see 37 CFR 1.5) (Not Yet Assigned - U.S. National Phase of Int'l PCT) 09/913694
INTERNATIONAL APPLICATION NO. PCT/FR00/03612	INTERNATIONAL FILING DATE December 20, 2000	PRIORITY DATE CLAIMED December 22, 1999
TITLE OF INVENTION: EDDY CURRENT RETARDER		
APPLICANT(S) FOR DO/EO/US Stefan BOUISSOU		

Applicant herewith submits to the United States Designated/Elected Office(DO/EO/US) the following items and other information:

1. ☒ This is a **FIRST** submission of items concerning a filing under 35 U.S.C. 371.
2. ☐ This is a **SECOND** or **SUBSEQUENT** submission of items concerning a filing under 35 U.S.C. 371.
3. ☒ This express request to begin national examination procedures (35 U.S.C. 371(f)) at any time rather than delay examination until the expiration of the applicable time limit set in 35 U.S.C. 371(b) and PCT Articles 22 and 39(I).
4. ☒ A proper Demand for International Preliminary Examination was made by the 19th month from the earliest claimed priority date.
5. ☒ A copy of the International Application as filed (35 U.S.C. 371(c)(2))
 - a. ☒ is transmitted herewith (required only if not transmitted by the International Bureau).
 - b. ☐ has been transmitted by the International Bureau.
 - c. ☐ is not required, as the application was filed in the United States Receiving Office (RO/US).
6. ☒ A translation of the International Application into English (35 U.S.C. 371(c)(2)) with attached drawings.
7. ☐ Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371(c)(3))
 - a. ☐ are transmitted herewith (required only if not transmitted by the International Bureau).
 - b. ☐ have been transmitted by the International Bureau.
 - c. ☐ have not been made; however, the time limit for making such amendments has NOT expired.
 - d. ☐ have not been made and will not be made
8. ☐ A translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3)).
9. ☒ An oath or declaration of the inventor(s) (35 U.S.C. 371(c)(4)). (Unexecuted)
10. ☐ A translation of the annexes to the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371(c)(5)).

Items 11. to 16. below concern other document(s) or information included:

11. ☐ An Information Disclosure Statement under 37 CFR 1.56, 1.97 and 1.98 with PTO Form 1449 attached;
12. ☐ An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included.
13. ☐ A **FIRST** preliminary amendment.
☐ A **SECOND** or **SUBSEQUENT** preliminary amendment.
14. ☐ A substitute specification.
15. ☐ A change of power of attorney and/or address letter.

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531 Rec'd PCT/. 16 AUG 2001

16. ☒ Other items or information:

PCT International Application Published Under the Patent Cooperation Treaty (Cover Page);

PCT Request (Form PCT/RO/101);

PCT International Search Report (Form PCT/ISA/210);

TO BE FILED

17. ☒ The following fees are submitted:

BASIC NATIONAL FEE (37 CFR 1.492(a)(1)-(5)):

Search report has been prepared by the EPO or JPO \$ 860.00
International preliminary examination fee paid to USPTO (37 CFR 1.482) \$
No international preliminary examination fee paid to USPTO (37 CFR 1.482
but international search fee paid to USPTO (37 CFR 1.445(a)(2)) \$
Neither international preliminary examination fee (37 CFR 1.482) nor
international search fee (37 CFR 1.445(a)(2)) paid to USPTO \$
International preliminary examination fee paid to USPTO (37 CFR 1.482)
and all claims satisfied provision of PCT Article 33(2)-(4) \$

ENTER APPROPRIATE BASIC FEE AMOUNT =

\$860.00

Surcharge of \$130.00 for furnishing the oath or declaration later than
☒ 20 ☐ 30 months from the earliest claimed priority date (37 CFR 1.492(e)).

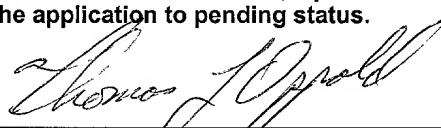
\$130.00

CLAIMS	NUMBER FILED	NUMBER EXTRA	RATE		
Total Claims	10 -20 =	0	X \$18.00	\$0.00	
Independent Claims	1 - 3 =	0	X \$80.00	\$0.00	
Multiple dependent claims(s) (if applicable) Yes			+ \$270.00	\$270.00	
TOTAL OF ABOVE CALCULATIONS =				\$1,260.00	
Reduction by 1/2 for filing by small entity, if applicable. Verified Small Entity must also be filed. (Note 37 CFR 1.9, 1.27, 1.28).				\$0.00	
SUBTOTAL =				\$1,260.00	
Processing fee of \$130.00 for furnishing the English translation later than <input type="checkbox"/> 20 <input type="checkbox"/> 30 months from the earliest claimed priority date (37 CFR 1.492(f)).				\$0.00	
TOTAL NATIONAL FEE =				\$1,260.00	
Fee for recording the enclosed assignment (37 CFR 1.21(h)). The assignment must be accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31).					
\$ 40.00 per property +				\$	
TOTAL FEES ENCLOSED =				\$1,260.00	
				Amount to be:	
				refunded	\$
				charged	\$

- a. ☒ A check in the amount of \$1,260.00 to cover the above fees is enclosed.
b. ☐ Please charge my Deposit Account No. 08-1650 in the amount of \$_____ to cover the above fees. A duplicate copy of this sheet is enclosed.
c. ☒ The Commissioner is hereby authorized to charge any additional fees which may be required, or credit any overpayment to Deposit Account No. 08-1650.

NOTE: Where an appropriate time limit under 37 CFR 1.494 or 1.495 has not been met, a petition to revive (37 CFR 1.137(a) or (b)) must be filed and granted to restore the application to pending status.

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Eddy current retarder

The present invention relates to an Eddy current retarder for a vehicle, intended to slow the rotation of a shaft driven about its axis.

5 Among such retarders, the invention relates more especially to those which are intended to slow the rotation of an engine shaft driven about its axis, particularly the crankshaft of a vehicle engine, this engine having a casing which itself comprises a frontal wall stretching substantially in a plane perpendicular to the axis of the engine shaft, which
10 engine shaft has one end which is directed toward the frontal wall of the casing of the engine and in the region of which the retarder is mounted overhangingly on the frontal wall of the casing of the engine via connecting means, the retarder comprising a rotor part which rotates as one coaxially with the engine shaft, a stator part coaxial with the engine shaft and
15 secured to the frontal wall of the casing of the engine, an armature belonging to the rotor part and an inductor belonging to the stator part, the inductor being arranged on a stationary annular component of the stator part, facing the armature.

Document JP9201037 describes an Eddy current retarder of the
20 abovementioned type.

Such a retarder has the advantage of having a simplified structure and a low weight and size, given its geometry with a ferromagnetic central disk rotating as one with the crankshaft and rotating between two disks which support energizing means consisting of permanent magnets
25 projecting axially toward the central disk, it being possible also for one of the two disks with permanent magnets to be rotated by a servomotor.

However, the main disadvantage with this retarder is that its braking torque is difficult to control. This is because two disks are equipped with permanent magnets, the magnetic flux of which is difficult to control. In
30 particular, this retarder does not make it possible to completely cancel the magnetic flux, particularly the magnetic flux tangential to the disks, which remains very high.

Another disadvantage of this retarder lies in the fact that it is arranged between the engine and a pulley that drives the timing and
35 accessories, said pulley being situated at the output of the crankshaft. What this means is that the pulley, thus distanced from the engine, will give rise to a significant overhang of the belt that drives the engine auxiliaries, which belt habitually runs around this pulley, such an overhang entailing moving all the accessories, and therefore creating a similar

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overhang in said auxiliaries in order to avoid, in the long term, causing this belt running around the pulley to break.

A particular object of the present invention is to overcome these drawbacks.

5 To this end, the rotor part of the retarder according to the invention has symmetry of revolution about the axis of the engine shaft so that it has a peripheral face facing a peripheral face of the stator part, the inductor of the retarder having at least one electromagnetic winding.

10 Thus, the Eddy current retarder maintains a compact structure while at the same time allowing simple and easy control over its magnetic flux by virtue of the presence of electromagnets.

In some preferred embodiments of the invention, recourse is had to one and/or other of the following arrangements:

15 - the rotor part has an external component of substantially cylindrical shape which surrounds the stator part and which constitutes the armature of the retarder, said external component having a radial flange secured to the engine shaft, said flange being pierced with a number of holes;

20 - the inductor of the retarder is an inductor with poles each surrounded by an induction winding and projecting radially outward on the external face of said annular component of the stator part;

25 - the poles are secured to a first annulus, while the collection of induction windings constitutes a second annulus of larger diameter than that of the first annulus, said second annulus being assembled coaxially with said first annulus by fitting each pole into a respective induction winding;

- the inductor of the retarder is an inductor with claws and with one single induction winding;

30 - a first set of claws constitutes a first annulus and a second set of claws constitutes a second annulus with the same diameter as that of the first annulus, said induction winding surrounding a cylindrical component of a diameter smaller than that of the first and second annuli, these being assembled coaxially with said cylindrical component in such a way that each claw of the first set of claws is interspersed between two adjacent
35 claws of the second set of claws;

- the connecting means comprise a framework which has at least one substantially radial flange centered on the engine shaft and pierced with a number of holes, said flange itself having arms which extend from it toward the engine to secure the framework to the frontal wall of the casing

of the engine, the electromagnetic retarder being housed in a space delimited by the flange, the fixing arms and the frontal wall of the engine;

- a pulley situated at the output of the engine shaft is arranged between the casing of the engine and the retarder; the flange of the external component advantageously incorporating the pulley, so as to
5 reduce the number of parts in the assembly;

- said induction winding (or windings) is (or are) energized from an electrical source, which is regulated for power, of the vehicle.

Other features and advantages of the invention will become
10 apparent in the course of the following description of one of its embodiments, which are given by way of nonlimiting example with reference to the appended drawings.

In the drawings:

- figure 1 is an exploded perspective view of the Eddy current retarder according to a first embodiment of the invention, before it is
15 mounted on the casing of the engine;

- figure 2 is a view in cross section of the retarder of figure 1, after its rotor and its stator have been assembled;

- figure 3 is a perspective view of the retarder of figure 1, depicting the latter in its position mounted on the casing of the engine;
20

- figure 4 is a schematic exploded perspective view of an alternative form of the stator of the retarder of figures 1 and 2.

Referring to figures 1 and 2, a first embodiment of the Eddy current retarder 1 according to the present invention comprises an armature rotor
25 2 which rotates with a shaft rotated about a substantially horizontal axis X, this shaft consisting, in particular, of the crankshaft (not depicted) of a vehicle engine M. This engine comprises a casing 3 which itself has a frontal wall 3a stretching substantially in a plane perpendicular to the axis X of the crankshaft. The Eddy current retarder 1 further comprises an
30 inductor stator 4 comprising electromagnetic windings 5 which consist respectively of coils.

The aforementioned retarder 1 is intended to be arranged at the output of the crankshaft, on the same side as the pulley 6, and therefore on the opposite side to the output of the engine shaft that is connected to
35 the gearbox, said retarder being mounted overhangingly on the frontal wall 3a of the casing 3 of the engine M as depicted in figure 3. Unlike the arrangement anticipated in the prior art described above, it is contrived for the pulley 6, which conventionally lies at the output of the crankshaft, and which is intended to be surrounded by a belt 7 suitable for driving the

engine auxiliaries, such as the camshafts 8 and the alternator 9 in particular, together with the water pump, to be inserted between the retarder 1 and the frontal wall 3a of the casing 3 of the engine M so as to eliminate any problem of aligning the belt 7 with the auxiliaries it drives.

5 This solution proves thus to be far more compact than the one adopted in the prior art described above, because it does not entail compensating for the overhang of the pulley and of the belt by creating an overhang of the auxiliaries it drives.

10 More specifically, with reference to figures 1 and 2, the rotor 2 has an external component which is substantially cylindrical of revolution about the axis X and which has a circular cross section. This component is hollow so that it surrounds the stator 4. It has an envelope 10 and an end wall 11 forming a flange, the assembly being made of a ferromagnetic material, generally of steel, and equipped, on the outside of the envelope 15 10, with ribs 12, for example helical ribs, formed integrally with the envelope 10 and which are intended to act as radiator fins to cool the rotor 2 heated by the Eddy currents. These ribs 12 are also capable, if they have a suitable profile, of causing the rotor 2 to act like a fan, sweeping a stream of cooling air over the hot surfaces of the rotor 2 that need to be 20 cooled, when the retarder is in use. The rotor 2 is arranged coaxially with the axis X of the crankshaft, the flange 11 being fixed to the crankshaft by means of an axial screw which passes through the flange 11 and is fixed into the end facing it of the crankshaft. The flange 11 has a peripheral rim which is pierced with a number of holes 13, for example circular ones, the usefulness of which will be seen later on in the description. In addition, the 25 flange 11 may incorporate the pulley 6, these two elements then being produced as a single piece with the rest of the armature rotor 2.

30 In the example depicted, the stator 4 comprises two annuli 14 and 15 each of which has a substantially annular shape. Polar cores 16 project from the external peripheral surface of the annular 14, in a radial direction with respect to the latter. Said polar cores, of which there are twelve in the example depicted, but of which there may be any number, are uniformly distributed about the annulus 14, each polar core stretching parallel to the axis X of the crankshaft. The annulus 15 for its part consists of a 35 succession of twelve electromagnetic coils 5 close together so that they substantially define a circle centered on the axis X of the crankshaft. The annulus 15 has a diameter slightly greater than that of the annulus 14 so that it can be assembled coaxially with the annulus 14 by fitting each polar core 16 into a respective coil 5.

The various electromagnetic coils 5 are connected to a source of direct current, such as, for preference, the battery (not depicted) of the vehicle, via appropriate control and regulating devices (not depicted).

When the retarder is powered, an electric current runs through the electromagnetic coils 5 and these generate Eddy currents in the rotor 2 which thus passes in front of the polar cores 16 which are alternately positive and negative. This results in a torque which slows the crankshaft and heats the rotor 2, which heating is partially compensated for by the ventilation afforded by the ribs 12.

Such a mounting of the stator 4 therefore advantageously allows the magnetic flux to be controlled in a simpler and quicker way than in the retarder described in the prior art mentioned hereinabove. It is thus possible to completely cancel this flux by cutting off the current delivered by the battery.

It is contrived for the inductor stator assembly consisting of the assembly of the two annuli 14 and 15 to have a diameter and an axial length which are slightly smaller than those of the rotor 2, so that when the retarder 1 is being assembled, this assembly is introduced into the external component of the rotor 2, a small (for example with a thickness E of 1 to 3 mm) gap being left between the internal surface of the envelope 10 of the rotor 2 and the corresponding polar cores 16 of the annulus 14 of the stator 4. Such an arrangement thus makes it possible for the external component of the rotor 2 to travel past the polar cores 16 of the stator 4.

It should incidentally be noted that the hollow cylindrical shape of the retarder 1 according to the present invention makes it incontestably lighter and less expensive than the disk-type retarder of the prior art described hereinabove.

Still with reference to figures 1 and 2, the annulus 14 of the stator 4 is equipped, on its interior periphery, with bosses 17 which extend in the direction of the axis X of the crankshaft. In the example depicted, there are six of these bosses and they are arranged in the continuation of a first, third, fifth, seventh, ninth and eleventh successive polar core 16. Each of the bosses 17 is pierced with a tapped axial bore 18, intended to take a screw (not depicted) for securing the annulus 14 of the stator 4 to a framework 19. This framework is itself intended to be secured to the frontal wall 3a of the casing 3 of the engine M of the vehicle, as is depicted in figure 3.

The framework 19 is a rigid component which can be made, for example, of cast iron and aluminum alloy. This component comprises a

flange 20 which has a substantially annular shape and is arranged in a more or less radial plane coaxial with the axis X of the crankshaft. The flange 20 has a central opening 21 to lighten it. It also comprises a peripheral part 22 which is pierced with a number of holes 23, for example rectangular ones, the utility of which will be seen later on in the description. The framework 19 also comprises arms 24 which each stretch axially in the direction of the axis X of the crankshaft, from the outer edge of the peripheral part 22 of the flange 20. Each arm 24 has a base 25 pierced with a hole 26 which is designed to take a screw (not depicted) so that the framework 19 can be secured to the frontal wall 3a of the casing 3 of the engine M, as is depicted in figure 3. In the example depicted, there are three arms 24 and they are distributed at uniform spacings of 120° about the flange 20. The internal edge of the peripheral part 22 of the flange 20 is, for its part, provided with securing parts 27 each of which comprises a tapped hole. These securing parts 27 are six in number and are distributed at uniform intervals around said internal edge. They are also arranged in such a way that when the retarder 1 is mounted on the framework 19, they come respectively into register with the bosses 17 of the annulus 14 of the stator 4 so that the screws, associated respectively with the bosses 17, can be screwed into the tapped holes of the securing parts 27, this being so as to secure the annulus 14 of the stator 4 to the framework 19.

Furthermore, it is contrived for, on the one hand, the flange 20 to have an outside diameter slightly greater than that of the envelope 10 of the rotor 2 and, on the other hand, for the securing arms 24 to have a length which is slightly greater than the axial length of the rotor 2, so that in the mounted position on the frontal wall 3a of the casing 3 of the engine M, the retarder 1 is housed entirely between the flange 20 of the framework 19, the arms 24 thereof and the frontal wall 3a of the casing 3 of the engine M, as can be seen in figure 3.

Such a configuration of the framework 19 and of the retarder 1 thus makes it possible to produce a compact assembly of the retarder 1 on the casing 3 of the engine M. Furthermore, the rotor 2 has the advantage, given its shape and arrangement, that it can act as a flywheel, supplementing the flywheel 28 as depicted in figure 3, which is arranged against the rear wall 3b of the casing 3 of the engine M.

This assembly also has the advantage of being particularly light in weight, not only because of the hollow cylindrical geometry of the assembly consisting of the framework 19 and of the retarder 1, but also

because of the presence of the holes 13 and 23 made respectively in the flange 11 of the rotor 2 and in the flange 20 of the framework 19. It should be noted that the holes 13 and 23 also have a function of allowing cooling air to circulate in the direction of the stator 4 so as to reduce the heating of the electromagnetic coils 5. Furthermore, the collection of holes 13 forms a thermal barrier which prevents the heat energy dissipated by the retarder 1 from propagating by conduction in the direction of the pulley 6.

An alternative form of the stator 4 of the retarder 1 of the invention will now be described with reference to figure 4.

In this second embodiment, the retarder 1 comprises, as in the first embodiment described hereinabove, a rotor 2 which is in every respect identical to the rotor depicted in figures 1 and 2 and which, for this reason, is neither described in detail nor depicted. The retarder 1 of figure 4 can be distinguished from that of figures 1 and 2 only in that it has a stator 4' made in three parts rather than two.

More specifically, this stator 4' comprises a component 4'a which is substantially cylindrical of revolution about the axis X and of circular cross section. The cylindrical component 4'a comprises an envelope surrounded by a conducting wire 5' which is wound in such a way as to form several successive turns 5'a of circular cross section. In a way known per se, the collection of these turns of wire 5'a constitutes the induction winding of the retarder 1. In the same way as the various electromagnetic coils 5 of the first embodiment depicted in figures 1 and 2, the turns 5'a wound around the cylindrical component 4'a are connected to a source of direct current such as, for preference, the battery (not depicted) of the vehicle.

In the example depicted in figure 4, the stator 4' further comprises two annuli 14' and 15' each of which has a substantially annular shape. These annuli are in every respect identical and consist respectively of a radial flange 14'a or 15'a pierced with a coaxial central hole 29 and with a succession of claws 14'b, 15'b which, in the example depicted, have a substantially triangular shape. The claws 14'b and 15'b are distributed at regular intervals about their respective annulus, each claw 14'b, 15'b stretching in the direction of an axis parallel to the axis X of the crankshaft, from the peripheral edge of the flange 14'a, 15'a associated with it. The annuli 14' and 15' have a diameter slightly greater than that of the cylindrical component 4'a so as to be assembled on the latter, said annuli 14' and 15' then being arranged coaxially with the cylindrical component 4'a. The axial length of the annuli 14' and 15' is determined in such a way that they, between them, substantially completely surround the cylindrical

component 4'a, each claw 14'b of the annulus 14' being interspersed between two adjacent claws 15'b of the annulus 15'.

As mentioned previously in the context of the first embodiment of the retarder 1 depicted in figures 1 and 2, it is contrived for the assembly consisting of the assembly of the two annuli 14' and 15' on the cylindrical component 4'a to have a diameter and an axial length which are slightly smaller than those of the rotor 2, so that when the retarder is mounted, this assembly is completely introduced into the external component of the rotor 2, a small (for example 1 to 3 mm wide) gap being left between the internal surface of the envelope 10 of the rotor 2 and the corresponding claws 14'b and 15'b of the stator 4', which thus makes it possible for the external component of the rotor 2 to travel past the claws 14'b and 15'b of the stator.

The way in which the retarder equipped with the stator 4' works is similar to the operation of the retarder according to the first embodiment described hereinabove. What this means is that when the retarder according to the second embodiment is powered, an electric current passes through the collection of turns 5'a and generates Eddy currents in the rotor 2 which then travels past the claws 14'b and 15'b of the stator 4' which are alternately positive and negative. This results in a torque which slows the crankshaft.

In a similar way to the stator 4 as illustrated in figure 1, the annulus 14' of the stator 4' is pierced with peripheral holes 18' each of which is intended to take a screw (not depicted) so that said annulus 14' can be secured to the framework 19.

CLAIMS

1. Eddy current electromagnetic retarder (1) intended to slow the rotation of an engine shaft driven about its axis (X), particularly the crankshaft of a vehicle engine (M), this engine having a casing (3) which itself comprises a frontal wall (3a) stretching substantially in a plane perpendicular to the axis (X) of the engine shaft, which engine shaft has one end which is directed toward the frontal wall (3a) of the casing (3) of the engine (M) and in the region of which the retarder (1) is mounted overhangingly on the frontal wall (3a) of the casing (3) of the engine (M) via connecting means (19), the retarder comprising a rotor part (2) which rotates as one coaxially with the engine shaft, a stator part (4; 4') coaxial with the engine shaft and secured to the frontal wall (3a) of the casing (3) of the engine (M), an armature belonging to the rotor part (2) and an inductor belonging to the stator part (4; 4'), the inductor being arranged on a stationary annular component (14, 15; 4'a, 14', 15') of the stator part (4; 4'), facing the armature, characterized in that the rotor part (2) has symmetry of revolution about the axis of the engine shaft so that it has a peripheral face facing a peripheral face of the stator part (4; 4'), the inductor of the retarder having at least one electromagnetic winding (5; 5').
2. The retarder as claimed in claim 1, characterized in that the rotor part (2) has an external component of substantially cylindrical shape which surrounds the stator part (4) and which constitutes the armature of the retarder (1), said external component having a radial flange (11) secured to the engine shaft, said flange being pierced with a number of holes (13).
3. The retarder as claimed in either of claims 1 and 2, characterized in that the inductor of the retarder is an inductor with poles (16) each surrounded by an induction winding (5) and projecting radially outward on the external face of said annular component (14, 15) of the stator part (4).
4. The retarder as claimed in claim 3, characterized in that the poles (16) are secured to a first annulus (14), while the collection of induction windings constitutes a second annulus (15) of larger diameter than that of the first annulus (14), said second annulus (15) being assembled coaxially with said first annulus (14) by fitting each pole (16) into a respective induction winding (5).
5. The retarder as claimed in either of claims 1 and 2, characterized in that the inductor of the retarder (1) is an inductor with claws (14'b, 15'b) and with one single induction winding (5').

6. The retarder as claimed in claim 5, characterized in that a first set of claws (14'b) constitutes a first annulus (14') and a second set of claws (15'b) constitutes a second annulus (15') with the same diameter as that of the first annulus (14'), said induction winding (5') surrounding a cylindrical component (4'a) of a diameter smaller than that of the first and second annuli (14', 15'), these being assembled coaxially with said cylindrical component (4'a) in such a way that each claw (14'b) of the first set of claws is interspersed between two adjacent claws (15'b) of the second set of claws.

7. The retarder as claimed in any of claims 1 to 6, characterized in that the connecting means comprise a framework (19) which has at least one substantially radial flange (20) centered on the engine shaft and pierced with a number of holes (23), said flange (20) itself having arms (24) which extend from it toward the engine (M) to secure the framework (19) to the frontal wall (3a) of the casing (3) of the engine (M), the electromagnetic retarder (1) being housed in a space delimited by the flange (20), the fixing arms (24) and the frontal wall (3a) of the engine (3).

8. The retarder as claimed in any of claims 1 to 7, characterized in that a pulley (6) situated at the output of the engine shaft is arranged between the casing (3) of the engine (M) and the retarder (1).

9. The retarder as claimed in claim 8 as associated with claim 2, characterized in that the flange (11) of said external component (2) incorporates the pulley (6).

10. The retarder as claimed in any of claims 1 to 9, characterized in that said induction winding (5; 5') is energized from an electrical source, which is regulated for power, of the vehicle.

FIG.1.

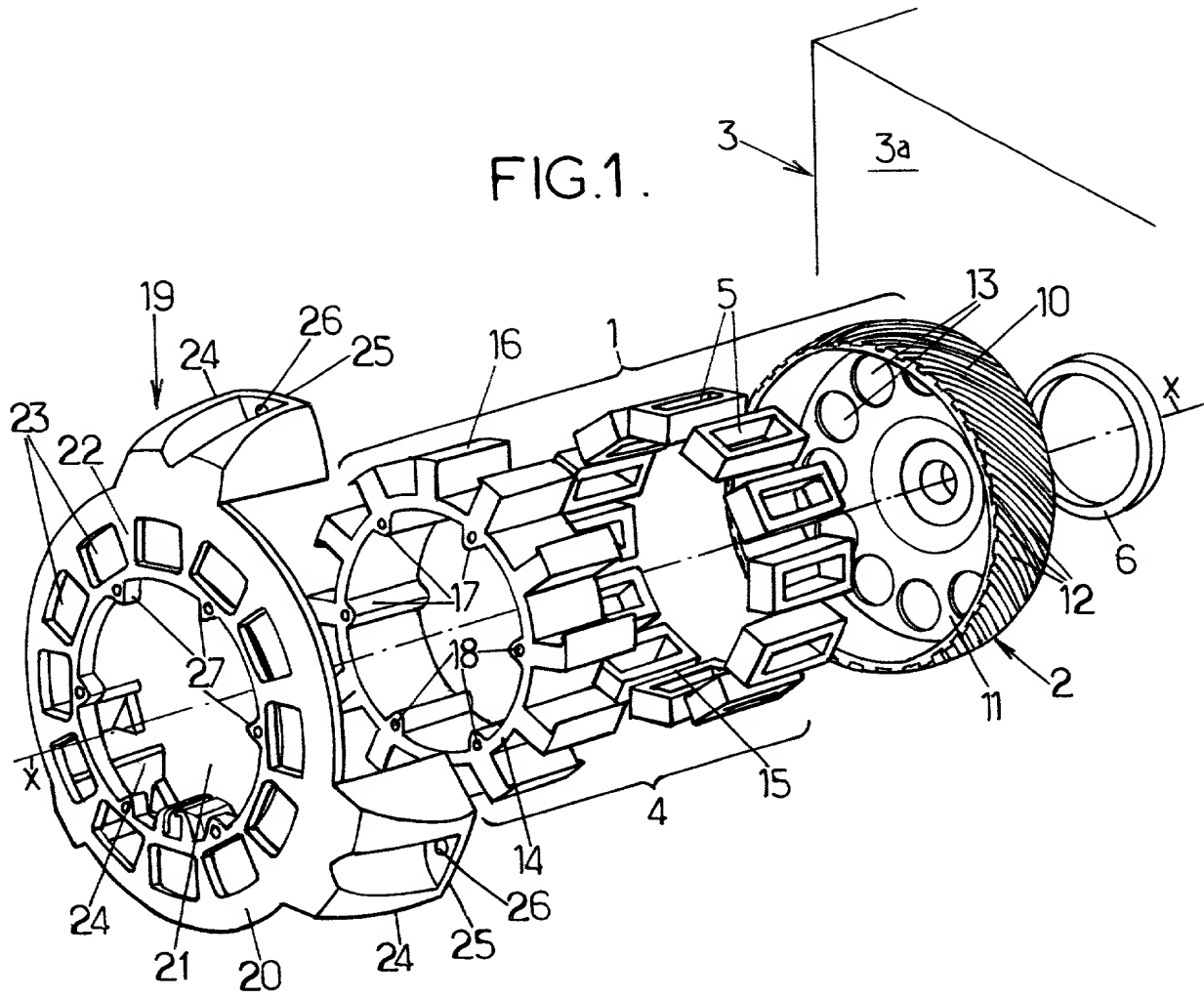
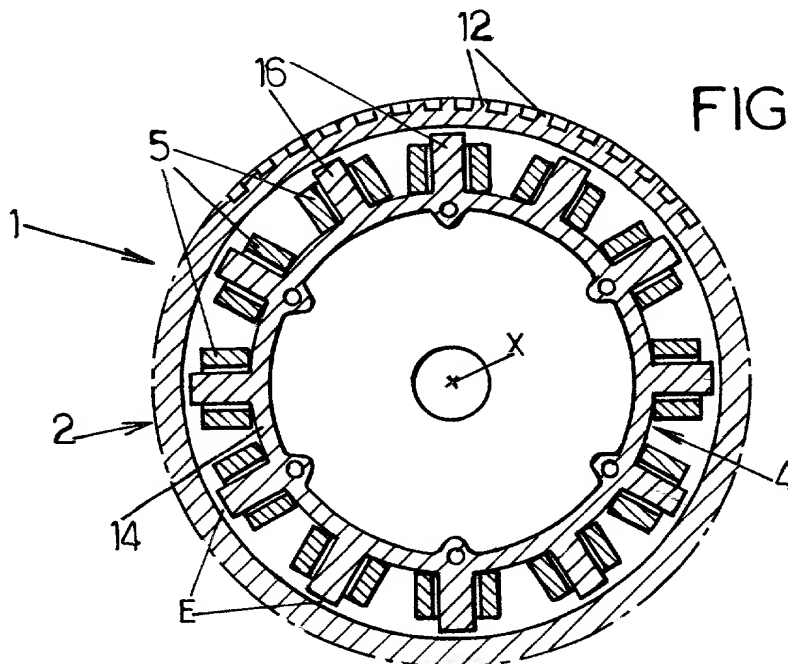
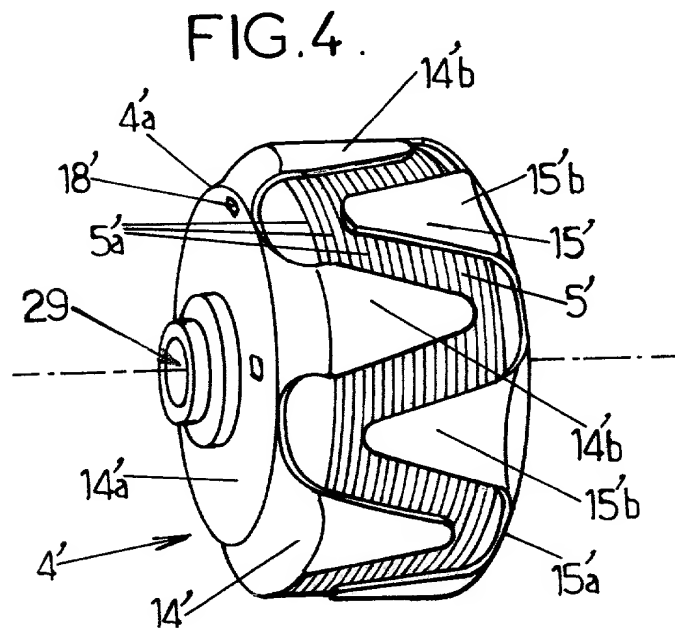
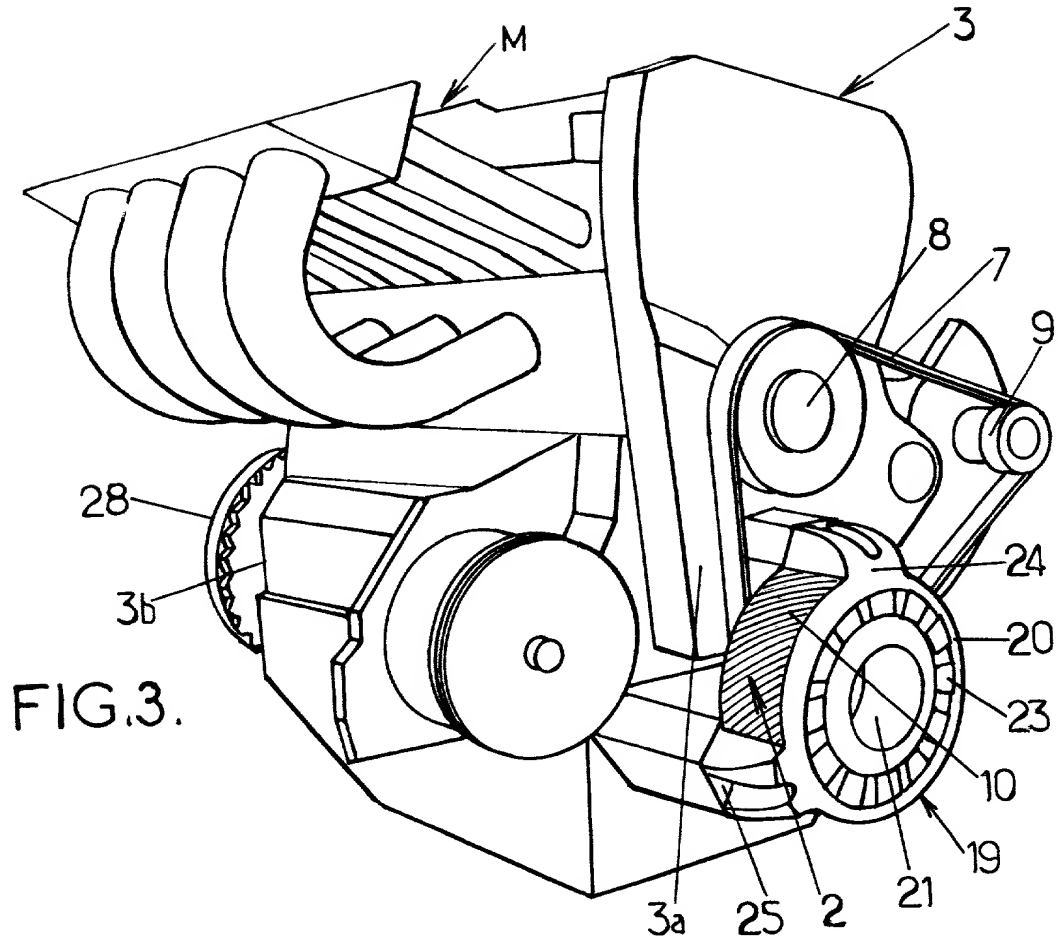


FIG.2.





COMBINED DECLARATION FOR PATENT APPLICATION AND POWER OF ATTORNEY

Docket No. _____

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name.

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled EDDY CURRENT RETARDER, the specification of which(check) ☒ is attached hereto.☐ was filed on _____ as Application Serial No. _____
and was amended on _____ (if applicable).☐ was filed as PCT international application Number _____ on _____
and was amended under PCT Article 19 on _____ (if applicable).

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose all information known to me to be material to patentability of this application in accordance with Title 37, Code of Federal Regulations, §1.56.

I hereby claim foreign priority benefits under Title 35, United States Code, §119 of any foreign application(s) for patent or inventor's certificate or of any PCT international application (s) designating at least one country other than the United States of America listed below and have also identified below any foreign application for patent or inventor's certificate or of any PCT international application (s) designating at least one country other than the United States of America filed by me on the same subject matter having a filing date before that of the application on which priority is now claimed:

Prior Foreign Application(s) _____ Priority Claimed

<u>99 16241</u>	<u>FRANCE</u>	<u>22-12-1999</u>	
(Number)	(Country)	(Day/Month/Year Filed)	Yes No

_____ (Number)	_____ (Country)	_____ (Day/Month/Year Filed)	Yes No
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_____ (Number)	_____ (Country)	_____ (Day/Month/Year Filed)	Yes No
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I hereby claim the benefit under Title 35, United States Code, §120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code, §112, I acknowledge the duty to disclose material information as defined in Title 37, Code of Federal Regulations, §1.56(a) which occurred between the filing date of the prior application and the national or PCT international filing date of this application:

<u>PCT FROO/03612</u>	<u>22-12-2000</u>	
(Application Serial No.)	(Filing Date)	(Status--patented, pending, abandoned)

_____ (Application Serial No.)	_____ (Filing Date)	_____ (Status--patented, pending, abandoned)
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I hereby appoint the following attorney(s) and/or agents(s) to prosecute this application and to transact all business in the Patent and Trademark Office connected therewith: H. Robert Henderson, Reg. No. 18,486; Michael O. Sturm, Reg. No. 26,078; John E. Cepican, Reg. No. 26,851; Richard L. Fix, Reg. No. 28,297; William H. Wright, Reg. No. 26,424; Martin G. Mullen, Reg. No. 28,574; Daniel B. Greenwood, Reg. No. 35,885; and Curtis A. Bell, Reg. No. 36,742.Address all telephone calls to Martin G. Mullen telephone no. 202/296-3854
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I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

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